

W6IFE San Bernardino Microwave Society Newsletter

W6IFE Newsletter

President Dick Bremer, **WB6DNX** 1664 Holly St. Brea, CA 92621--714-529-2800 --rabremer@juno.com

VP Ken Halford, **WB6DTA** 2901 Joaquin Dr. Burbank, CA 91504 --818-848-9059

Recording Sec Dick Kolbly **K6HIJ** 26335 Community Barstow, CA 92311--760-253-2477 --
rkolbly@compuserve.com

Corresponding Sec Larry Johnston, **K6HLH** 16611 E. Valeport Ave Lancaster, CA --805-264- 4110 --
ljohns@qnet.com

Treasurer Dick Kolbly **K6HIJ** 26335 Community Barstow, CA 92311 --760-253-2477 --
rkolbly@compuserve.com

Editor Bill Burns **WA6QYR** 247 Rebel Rd Ridgecrest, CA 93555 760-375-8566--bburns@ridgecrest.ca.us

ARRL Interface Frank Kelly **WB6CWN** 1111 Rancho Conejo Blvd. #501 Newbury Park, CA 91320 --805-499-
8047--fk@event1.com

FCC Interface Dave Laag **K6OW** 11614 Indian St. Moreno Valley, CA 92557 --909-924-1517

W6IFE License Trustee Ed Munn **W6OYJ** 6255 Radcliffe Dr. San Diego, CA--92122 619-453-4563--
edmunn@compuserve.com

The 3 **December 1998** meeting of the SBMS will have Dick, K6HIJ talk about microwave scattering or how those waves travel over hill and dale between non-line of site stations. The SBMS meets at the American Legion Hall 1024 Main Street (south of the 91 freeway in Corona, CA at 1930 hours local time on the first Thursday of each month..

Last Meeting- Kerry, N6IZW , of the San Diego Microwave Group, made his first 24 GHz narrowband contact across the room with his modified Qualcomm Omnitrac board (no antennas, just open board with 2 mtr HT) to Dave, WA6CGR with his new 24 GHz SSB rig. The Omnitrac board was originally for 14 GHz uplink and 12.7 GHz down link. As a 24 GHz rig it is now running with a 2290 MHz synthesizer which multiplied gives a 11,450 half LO to the mixers so to have a 1292 MHz first IF and then Kerry converts to a 147 MHz second IF. The conversion of the Omnitrac units for 10 GHz is not a beginners project and definitely the conversion to 24 GHz is beyond that. Kerry had his surplus Austron Model 2100F Loran C Frequency Monitor unit to check reference oscillators of the membership. Bill, WA6QYR had one of the Qualcomm synthesizers (modified) which read as -8×10^{-8} relative frequency. Several other members had oscillators measured. Kerry had put out about 100 ft of wire to the flag pole to get the Loran C 100 KHz signal (from either the station at Fallon, NV or Searchlight, NV) which is compared to the oscillator under measurement. Direct reading accuracy's in the order of 10-12 can be obtained. Thanks Kerry for talk and measurements. Ed, W6OYJ indicated that A&A Engineering was advertizing pc boards to the July 1998 QST article on a GPS referenced oscillator standard. The Palos Verde 10 GHz beacon is down and moving to a new site soon. New members are Peter Lyman, K6PTL of Pasadena; Paul de

Jonckheere, WB6GHK of Riverside; and Gene Cranston, WA6YOJ now of Sun City renewed his membership. Welcome to ALL. Ed, W6OYJ indicated a nice microwave web page at <http://df6na.mayn.de> by Rainer Allraun, DF6NA of Germany. Chuck, WA6EXV indicated that Frank Kelly, WB6CWN's mother passed away in October. SBMS is looking for a leader of the winter social event- Bill, WA6QYR volunteered to have it in Ridgecrest, if the membership wished to drive north. No other takers came forward and the idea was delayed until next month. 24 people present.

Scheduling-

Jan 7, 1999 Dave WA6CGR 24 GHz narrowband rig

Feb. 4 George, K6MBL TBD

Feb. winter SBMS social needs chairman/ coordinator

Mar 4 Chuck WA6EXV TBD

Activity reported at 5 November meeting

Ken WB6DTA worked with Bob W6SYA on some 24 GHz dishes, chuck, WA6EXV is working on restoring a 10 GHz klystron amplifier (3500v 80 ma 56 dB gain with -10 dBm input) and has been measuring a primestar feed; Bill WA6QYR obtained a Prime star dish and feed and has been working on a Qualcomm synthesizer; Ed W6OYJ has MA/ COM LO problems; Kerry, N6IZW has been working on frequency standards and a 24 GHz rig using the Qualcomm Omnitrac board (the one used for 10 GHz rig, but tuned for 24 GHz); Dave, WB6OVZ received some MA/COM rig parts; Mel, WA6JBD is working on an IF radio for his 24 GHz rig and some MC2000 radios for Robin; George, K6MBL received some documents of work by Yagi and some split anode magnetron work in 1928; Dick, K6HIJ is working on some DC servos; Jim, K6ML is moving stuff; Larry, K6HLH has a 3456 MHz Down East transverter working in addition to his 2.4 and 5.6 GHz rigs; Al, K6LJM did some work on the Heaps PK ATV systems on 2418 and 3480 MHz; Bob, W6SYA built some flat plate reflectors for his 24 GHz dish (like N6CA design); Ed, K6ODV got his 10 GHz rig working with help from WA6CGR; Dave, WA6CGR worked on the SBMS website by adding some of the MA/COM conversion data along with a 3456 Gasfet amp circuit and the 2 mtr to 10 mtr converters, also rebuilt the 900 MHz through 10 GHz radios with a new phaselock system; Joe, K6IBY worked on some 4CX400 rig for 432 MHz; Dick, WB6DNX work on some 2.3 GHz stuff.

Wants and GOTS (for sale)

For sale Arc Welder (295 a secondary, about 30a 230v primary) Jim K6ML 626-447-6541.

For sale- HP430B power meter, no head \$25; HP431C, no head, \$25; HP X382A WR90 x-band attn. new \$28
Dick, WB6DNX 714-529-2800.

For Sale- Kenwood TH-21AT small 2 mtr handheld (5"x2.5"x1.2") 150 mw lo pwr, 1.7w hi pwr, wall charger, DC-21 car pwr supply-\$60; Honeywell Rediline motor-gen 12v in 120vac 60 Hz sine out 500w \$80. Bill WA6QYR 760-375-8566 bburns@ridgenet.net.

Wanted- HP 8441A Preselector (tracking filter) for HP8551B spectrum analyzer Bill WA6QYR 760-375-8566 bburns@ridgenet.net.

FOR SALE (1) Drake L7AM, SerNo 147, HF 1 kW, linear power amplifier, 160-10 mtrs (no WARC bands), xInt cond, with (2) Drake L7PS, SerNo 204, companion power supply, xInt cond, in/out cables attached, manual, orig invoice, 220 vac plug & receptacle \$900; (21) KLM 2M-2N 144-148 MHz, air dielectric, pwr divider, New In Box, N connectors \$75; (23) Alliance HD-73, SerNo 4807, 2 speed antenna rotator and control box, 11 sq. ft. xInt cond, mast mount, manual, invoice \$150; (24) Alliance HD-73, SerNo 24680X, 2 speed antenna rotator and control box, 11 sq. ft. xInt cond, mast mount, manual, cy of invoice \$150; (28) Micronta 22-119 LCD digital

multimeter, xlnl cond, test leads, manual, orig box \$10; (30) Pace P5403A, citizens band, SWR/Watt meter, xlnl cond, 5 Watt dummy load, instructions \$5 Contact: Elvy Hopkins NØLV, 760-384-3589 (after 10 AM Pacific time), e-mail ehopkins@ridgenet. PICK UP of equipment in Ridgecrest, Calif. is PREFERRED. Crating, packing and shipping will be paid by buyer. All equipment will be sold AS IS. NO RETURNS. NO REFUNDS. All equipment has been well cared for and shows no abuse. All equipment worked when last used five years ago. (We disassembled the ham shack for this sale.) All of this equipment belongs to an incapacitated amateur radio operator. Sale will help finance medical expenses. "Eleanor Besancon" is payee for all monetary transfers. 16 Oct. 98.

Oscillators and Measurements

In the 1997 ARRL Handbook under the Test Procedures and Projects chapter, there is a discussion of frequency measurement. A similar discussion is in the Time and Frequency Users Manual of the National Institute of Standards and Technology (NIST). The hydrogen maser and cesium oscillators are relatives to the rubidium standard that Doug K6JEY talked to us about some months ago. The apparent accuracy of a hydrogen maser and cesium oscillator is in the order of several parts in 10-14 at a price in the \$30,000 to \$200,000 range. These are what NIST uses for primary standards. The rubidium frequency standard is less expensive with near the same frequency accuracy. Some SBMS members have "used" rubidium sources.

The average ham usually uses a crystal oscillator for reference in the shack. Since the crystal frequency is affected by the ambient temperature, one could have the "shack standard" change by tens of Hertz for a couple of degrees change in room temperature. The next best thing to do is to put the crystal oscillator in a proportional oven operating at some constant temperature above the ambient, like in the two way radio business that have on the order of 0.1 parts per million (10-7) per day stability over most environments. One can go one more step and put the ovenized oscillator within another oven (double oven) and reach toward 10-12 according to a November 1998 ad in one of the trade magazines.

Since a number of us are picking up older test equipment at the swap meets, some of the counters have ovenized crystal oscillators that reach to 10-9 and 10-10 stability and since they have been around for a while their crystals have reached the end of the aging process and have become quite stable with time. One of the things we would like to do is to check to make sure our microwave rig is on frequency. In most cases we are either mixing up or multiplying up frequencies from some crystal oscillator. With each multiplication any error or instability in the basic oscillator is also multiplied. In a number of counter plug-ins the basic counter oscillator is multiplied so that microwave signals can be then mixed with the multiplied LO and then the IF can be counted with the basic counter which may operate to 50 or 100 MHz. In either case of our rig oscillator or the counter oscillator, we are depending upon its stability and accuracy to measure the signal at 2304 MHz or 10,368 MHz.

At the November SBMS meeting Kerry, N6IZW brought to us a VLF comparator which would let one check the operation of that rig or counter oscillator. Kerry's device used the received signal of Loran C at 100 KHz for comparison. By dividing down the Loran C signal to say one Hz and dividing down your counters 10 MHz oscillator to one Hz, the comparator can then tell you the error of your counter. NIST in Colorado keeps track of the Loran C transmitted signals. The Loran C signals are accurate to 1×10^{-12} over a 24 hour period and so are useful in checking the rubidium frequency standards. Kerry's comparator reads out the error of our local standard in relative frequency. Relative frequency (F) is calculated from the difference between the actual frequency and the name plate value divided by the name plate value. The 10 MHz Temperature Controlled Crystal Oscillator (TCXO) I brought in was measured at -8×10^{-8} . This means it was 20 Hz low at the 10 MHz name plate frequency. Usually one needs to let the comparator run for a while to get a good check of the oscillator under test. 24 hours is the usual measurement period.

Kerry also brought in a WWVB tracking receiver/ comparator to show. This device does a similar job as the Loran C unit. WWVB is at 60 KHz and has a relative frequency of about 1×10^{-11} . These older receivers have a chart recorder and or a mechanical counter to measure the phase shift (in microseconds) between WWVB and your local standard. One calculates the relative frequency by using the number of microseconds change over 24 hours divided by 86,400,000,000. This big number is the number of microseconds in 24 hours. I was checking one of my HP5245L counter oscillators with the WWVB receiver and came up with 1×10^{-8} . This gives me a

handle on how far off my counter will read when using one of the fancy plug-ins to measure my 10 GHz rig. The WWVB units are capable of 10-11 measurements according to NIST.

One of the errors the user needs to know about in using the VLF comparators is the diurnal propagation shifts in the VLF path which can amount to several microseconds over 24 hour measurements. These are less than the HF path shift for WWV. Because WWVB is in Colorado there are some long paths to parts of the USA. The advantages of Loran C signal, in addition to being more accurate to begin with, is that there are transmitter sites around the US and the world so the path lengths are not as great.

The next measurement toy to pickup is the GPS referenced oscillator similar to the ham version described in the July 1998 QST. Several company's build such GPS tools, but they are also on the expensive side. Ball (USA) and Tekelec Temex (France) manufacture Crystal, GPS, and atomic standards.

The NIST manual also tells how to use WWV and WWVH HF standard signals to obtain relative frequency measurements of 10-6 to 10-7.

References:

NIST Special Publication 559 (revised 1990) Time and Frequency Users Manual

The 1997 ARRL Handbook for Radio Amateurs.

Bill WA6QYR 11-21-98

Kerry N6IZW with his VLF comparator



K6HLH(r) showing Dick, K6HIJ his modified Qualcomm synthesizer.



73's Bill

[back to SBMS homepage](#)